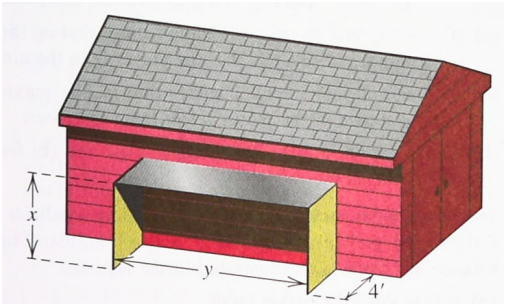
Quadratic Applications 2 '0809

1) An open rectangular storage shelter, consisting of two 4-foot-wide vertical sides and a flat roof, is to be attached to an existing structure (see figure). The flat roof is made of tin and costs $5 per square foot, and the two sides are made of plywood costing $2 per square foot.

a) If $400 is available for construction, express the length y as a function of the height, x.

b) Express the volume, V(x), inside the shelter as a function of x.

c) Find the maximum volume possible.



2) From a rectangular piece of cardboard having dimensions 20 inches x 30 inches, and open box is to be made by cutting out identical squares with sides x from each corner and turning up the sides.

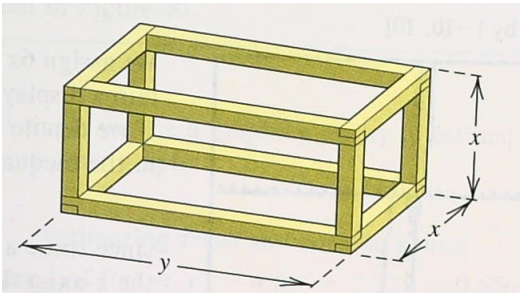
a) Find a function, V(x), to find the volume of the box.
b) Find the relative domain of the function.
c) Find a maximum volume.

3) The frame of a shipping crate is to be constructed from 24 feet of 2x2 lumber (see figure).

a) If the crate is to have square ends of side x feet, express the outer volume V of the crate as a function of x (disregard the thickness of the lumber).

b) Find the relative domain of the function.

c) Find a maximum volume.



4) A storage shelter is to be constructed in the shape of a cube with a triangular prism forming the roof (see the figure). The length x of a side of the cube is yet to be determined.

a) If the total height of the structure is 6 feet, find a function to find the volume given x.

b) Determine x so that the volume is 80 cubic feet.

c) What value of x will give you a maximum volume?